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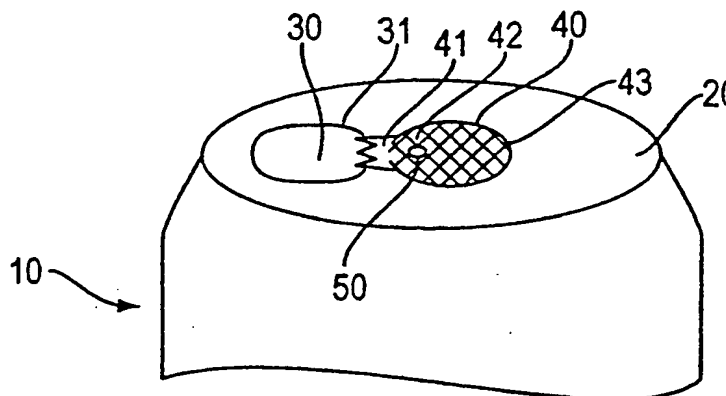
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(54) Title: DECORATIVE AND SYMBOLICALLY SHAPED PULL TAB CONTAINER OPENING DEVICES AND METHODS OF MAKING THE SAME

## (57) Abstract

A container opening device, container lid (20), or can top with a decorated feature, or in the case of an opening device, a symbolically shaped pull tab (40) for attachment to a container to perform the dual functions of opening the container and decorating the container for equity, identification or promotional purposes. The pull tab (40) may open the container by acting as a lever which presses against a tear strip (30) in the container top (20) defined by a tear line (31) to separate the tear strip from the container top (20) and open the container (10).

The pull tab (40) may perform a decorative and promotional function by having a decoration or a symbolic shape that is to be recognized as a picture, trademark, icon, character, or other symbolic item or logo. The decoration can be enhanced further by applying color, printing, embossing and labels to the pull tab (40), lid (20) or container (10). The pull tab (40) or decoration can take the shape and design of corporate logos, trademarks, icons, etc. In an alternative embodiment, the pull tab (40) may have a weakened portion (44) so that a piece of the pull tab may be removable from the container as a token or memento.



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# DECORATIVE AND SYMBOLICALLY SHAPED PULL TAB CONTAINER OPENING DEVICES AND METHODS OF MAKING THE SAME

This application is a Continuation-in-Part of Applicant's Co-Pending  
5 U.S. Application Serial No. 08/917,516 filed August 26, 1997, entitled  
"Symbolic Pull Tab Container Opening Device."

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The invention relates to decorated substrates and, more particularly,  
10 to container opening devices, decorated containers, and methods of making  
the same.

### 2. Description of the Related Technology

U.S. Patents 4,465,204 and 4,530,631 disclose traditional pull tab  
container opening devices commonly used on container tops and a method  
15 for manufacturing the tabs. U.S. Patent Des. 289,017 discloses the design of  
a traditional pull tab.

U.S. Patent 3,958,354 discloses the placement of a promotional piece  
in the finger hole of a traditional pull tab. U.S. Patent 5,191,695 discloses a  
method for placing such a promotional piece in the finger hole of a pull tab.

20 U.S. Patent 4,322,016 discloses placement of a pressure sensitive label  
on the underside of a pull tab for promotional purposes.

U.S. Patent 4,363,179 discloses placement of a promotional material  
on the top of a can underneath of a pull tab.

25 U.S. Patent 5,416,951 discloses a pull tab for attaching a decorative  
item to a sliding fastener such as a zipper.

## SUMMARY OF THE INVENTION

The food and beverage industry has not utilized pull tab container  
opening devices for package enhancement, brand identification, brand  
marketing promotion, or informational purposes. Most existing pull tab

designs only serve the function of allowing the user to open the can. See,  
e.g., U.S. Patents 4,465,204, 4,530,631, and Des. 289,017. Pull tab openers  
have been used for package promotion by placing promotional pieces in the  
finger hole of the pull tab (See U.S. Patents 3,958,354 and 5,191,695),  
5 placing pressure sensitive labels on the pull tab (See U.S. Patent 4,322,016),  
and placing promotional material on the container top beneath the pull tab  
(See U.S. Patent 4,363,179). However, all of these promotional concepts  
retain the traditional shape of a pull tab as shown in U.S. Patent 4,465,204  
in order to minimize the tab weight. None of the prior art contemplates  
10 using the top of the pull tab itself as a promotional or decorative piece or to  
provide information to the consumer. None of the prior art contemplates  
using the bottom of the pull tab itself as a decorative piece or to provide  
information to the consumer.

Accordingly, in one aspect of the invention there is provided a pull tab  
15 container opening device having informational, promotional or decorative  
materials integral therewith. In another aspect of the invention, there is  
provided a pull tab container opening device having a symbolic shape for  
promotional or decorative purposes. In a related aspect, there is provided  
methods of manufacturing pull tabs according to the invention.

20 In accordance with the present invention, there is provided a pull tab  
container opening device having a novel shape for use on a container end.  
Prior art pull tabs consist of an open-tab design wherein a nose portion and  
a ring-shaped grab portion for receiving a finger are attached to a container  
at an attachment point on the tab. The tab is made of a piece of sheet metal  
25 that has apertures punched out to form two rings and has the edges curled  
under the tab. The prior art design is intended to minimize the weight of  
the tab and maximize its strength.

In one embodiment, the pull tabs of the present invention include a  
grab portion attached to a nose portion with an attachment point between  
30 the nose portion and the grab portion. According to the present invention,  
minimizing the weight of the tab does not have overriding significance.  
Thus, the tab may be a continuous solid plate. Further, the tab does not  
require the edges to be curled under the tab for strength. The tab also does  
not require the edges to be curled under the tab to avoid sharp metal edges

since the tab may be manufactured from other materials. In other words, the tab of the present invention could have either curled or uncurled edges. Therefore, the tab may be a substantially planar member or a flat sheet. In one embodiment, the planar faces of the tab are substantially parallel to one another throughout the tab.

The tabs of the present invention may be made of any material capable of functioning as a pull tab for a container, including aluminum, steel, plastic, or any natural, synthetic, composite, or other suitable material. The selection of suitable materials are well within the ability of one of ordinary skill in the art. The tabs may also include at least one finger aperture. Construction of suitable pull tabs according to the invention are well within the ability of one of ordinary skill in the art.

According to the invention, the tabs of the present invention may be riveted or otherwise attached to the top of a container at the attachment point on the tab. The tab acts as a lever with the fulcrum at the attachment point so that lifting the grab portion causes the nose portion to push down on the container top and open a tear strip portion on the top. The nose portion may be designed as known in the art to effectively open the tear strip.

According to one aspect of the invention, there is provided a decorative tab. The term "decorative tab" is intended to mean a pull tab having informational, promotional or decorative materials integral therewith. Informational, promotional or decorative materials are intended to include, but are not limited to, any word, number, name, symbol, color, design, or image; and such materials will be referred to as "tab decorations" hereinafter. A decorative tab according to the present invention may have at least one finger aperture associated therewith; however, in a preferred embodiment there is provided a decorative tab having a closed-tab design. The closed tab design provides additional space to accommodate tab decorations.

Accordingly, one object of the invention is to provide a decorative tab having a closed-tab design and having tab decorations thereon. In one embodiment, there is provided a decorative tab having tab decorations embossed, debossed, etched or inscribed thereon. In another embodiment there is provided a decorative tab having tab decorations applied or affixed

thereto. Application or affixation of tab decorations may be carried out by any technological process including, but not limited to, inks, paints, silk screens, adhesives or glues. In another embodiment there is provided a decorative tab having an anodized surface, organic coating, or other coating applied thereto. The decorative tab may then be used as is, or, alternatively, the tab may then have tab decorations embossed, debossed, inscribed, etched, affixed or applied thereto. In still yet another embodiment there is provided a decorative tab having a plurality of layers which can be mechanically or chemically manipulated such that tab decorations of different colors or shades are provided on the tab.

Various coatings may be used. Suitable coatings include those conventionally used in the beverage container field. Alcoa supplies stock with suitable coatings supplied by Dexter, Valspar, BASF and others. The coating type is not limited to epoxy, vinyl or an anodized coating. If may be preferable to use a coating that contrasts with the color of the underlying material, which may be aluminum, other materials, or another coating layer. In addition, multiple layers of contrasting coatings may be used so that selective removal of layers may reveal a multiple color design.

It is a related object of the invention to provide a decorative tab having a coating and having tab decorations generated thereon by a laser or other optical device. In one embodiment there is provided a decorative tab having an uncoated surface, anodized surface or coated surface, or multiple layers of such surfaces, which is then treated with at least one optical device that generates substantially permanent tab decorations thereon. In another embodiment there is provided a decorative tab having an organically coated surface that is treated with at least one optical device that generates substantially permanent tab decorations thereon. In yet another embodiment there is provided a decorative tab having a plurality of layers which may be treated with at least one optical device that generates substantially permanent tab decorations of more than one color or shade thereon.

It is a related aspect of the invention to provide a decorative tab comprised of a material or materials capable of having tab decorations generated thereon (or therein) when treated with at least one optical device.



According to another aspect of the invention, there is provided a symbolic tab. The term "symbolic tab" is intended to mean a pull tab container opening device having a symbolic shape which allows it to simultaneously function as a container opener and a promotional or decorative piece. A symbolic shape means that the pull tab is shaped to be recognized as a picture, trademark, icon, character, or other symbolic item. Examples include a pull tab having the symbolic shape of a corporate logo, a trademark, a character, a Christmas tree, a football helmet, piece of fruit, etc. Thus, the tab could be utilized to promote products, facilitate redemption contests, and provide mementos for the purchaser. To effect the symbolic shape, the pull tab has a different shape than prior art pull tabs.

To enhance the symbolic shape, any of the methods discussed in connection with decorative tabs may be used to decorate the symbolic tab. Thus, in one aspect of the invention there is provided a decorative-symbolic tab. For example, an image may be attached to the symbolic tab. The image may be attached to the by tab any technological process including printing, embossing, debossing, silk screening, laser etching, or any other appropriate means. Any type of image may be attached to the symbolic tab including photographs, trademarks, holographs, bar codes, or any other appropriate image. The tab can simply be made from pigmented, colored stock in order to yield a specific image. Alternatively, the tab can be made from bare tab stock and subsequently decorated by printing, dyeing, or other appropriate means. In addition, an adhesive label may be attached to the tab.

The decorative and symbolic tabs according to the present invention may also be made in a severable two piece design. In such a design the tab has a weakness or perforation built into the tab between the grab portion and nose portion. After the tab pushes open the tear strip, the grab portion is removable from the tab as a token or memento. The weakness or perforation may be biased to permit exertion of a relatively higher force on the tab in the opening direction without separating the two portions and to permit exertion of a relatively lower force on the tab in the opposite direction which will separate the two portions.

According to another aspect of the invention, there is provided a die area of a conversion press modified such that the stamping and forming

steps of manufacturing a pull tab yield a pull tab in accordance with the present invention as described above. The tab may be formed from narrower or wider tab stock than that used in traditional manufacturing methods. Subsequent forming of the grab portion can emboss or otherwise shape the grab portion, and also cut a finger aperture therein. The nose portion may be formed in the traditional manner as known in the art. Riveting or attachment of tabs to container lids may be done according to any of the methods generally known in the art.

The present invention also relates to methods of making decorative tabs as described above. Tabs can be formed by a conversion press and stamped and formed by the modified tab die area of the present invention. Tab decorations can be applied on the monolithic tab stock, on formed tab stock strip, or on the tabs after exit from the conversion press. Mechanical or computer recognition systems may be utilized to assure accurate and uniform application of the tab decorations. In a preferred embodiment of the present invention, there is provided at least one laser to etch tab decorations on tabs. The laser may be positioned at any point or place to etch the tab stock prior to initial entry into the conversion press, to etch the formed tab stock strip after exit from the forming and curling dies of the conversion press, or to etch the tabs after conversion and exit from the conversion press.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a container incorporating a pull tab container opening device according to the present invention.

FIG. 2 is a top plan view of the container in Figure 1.

FIGS. 3A-3D are cross-sectional views taken along line III-III of FIG. 2. These figures show the steps in using the pull tab to open the container.

FIG. 4 is a cross-sectional view similar to Figure 3A and showing an embodiment comprising an adhesive label attached to the pull tab.

FIG. 5 is a top plan view of an alternative embodiment of the invention wherein the a pull tab is attached to a container in which almost the entire top of the container is removable along with the pull tab.

FIG. 6 is a cross-sectional view similar to Figure 3A and showing an alternative embodiment wherein the pull tab is formed in two pieces so that the pieces are severable from each other.

FIG. 7 is a top view of an embodiment of a pull tab manufacturing apparatus according to the present invention.

FIG. 8 is a top view of an alternative embodiment of a pull tab manufacturing apparatus according to the present invention.

FIG. 9 is a top view of another alternative embodiment of a pull tab manufacturing apparatus according to the present invention.

FIG. 10 shows a top view of a can top according to one embodiment of the invention.

FIG. 11 shows a bottle cap with a laser etch decoration according to one embodiment of the invention.

FIG. 12 shows a multi-layer structure according to one embodiment of the invention.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT:

A representative pull tab container opening device according to the present invention is indicated generally at 40. In the first preferred embodiment, as shown in Figures 1-2 and 3A-D, the pull tab 40 is attached to a container 10. The pull tab 40 includes a nose portion 41 and a grab portion 43. The container includes a top 20. The top includes a tear strip 30 defined by tear line 31 and a tear line interruption 32.

The pull tab 40 has an attachment point 42 attached to the container top 20 by a rivet 50 so that the nose portion 41 of the pull tab 40 is articulating against tear strip 30. As shown in Figures 3A-3D, the pull tab 40 acts as a lever with the fulcrum at the attachment point 42 to open tear strip 30. When the user lifts grab portion 43, nose portion 41 applies a downward force to tear strip 30 causing the tear strip 30 to separate from container top 20 along tear line 31. Tear line interruption 32 holds tear strip 30 to container 20 and prevents it from dropping into the container.

After actuating the pull tab 40 to open container top 20, pull tab 40 can then be bent back to its original position as shown in Figure 3D.

5 In the embodiment depicted in Figures 1-2 and 3A-D pull tab 40 has a symbolic shape to decorate the container. The drawings show the symbolic tab having the symbolic shape of a pineapple. To enhance the symbolic shape, tab decorations such as the texture of the pineapple may be embossed on the tab and/or the colors of the pineapple may be printed upon the tab. However, one could envision alternative pull tab symbolic shapes including, but not limited to, corporate logos, trademarks, characters, icons, etc. One  
10 could also envision alternative tab decorations being provided on the tab.

To facilitate the tab having a symbolic shape, the tab may be a continuously solid plate. There is no need to have apertures in the tab. In the depicted embodiment, the solid plate is a substantially planar member having a top planar face 45 and a bottom planar face 46 that are  
15 substantially parallel to one another. In other words, the tab is made from a substantially flat sheet of material having substantially uniform thickness throughout. However, the symbolic shape could also be achieved in an embodiment wherein the pull tab is not a continuously solid plate, has apertures, is not a planar member and is not a substantially flat sheet. The  
20 tab is preferably shaped to be recognized as a picture, trademark, icon, character, or other symbolic item.

Figure 4 shows a second preferred embodiment of the invention. In this embodiment, a tab decoration comprising an adhesive label 60 is attached to the pull tab 40 to further enhance the pull tab's symbolic shape  
25 for promotional purposes. The label may be attached to any portion of the pull tab. The pull tab 40 has the same symbolic shape as discussed above in reference to Figures 1-2 and 3A-3D.

Figure 5 shows a third preferred embodiment of the invention. In this embodiment the pull tab 40' has the same elements and symbolic shape as  
30 pull tab 40 described above and is attached to the container top 20' by rivet 50'. However, in this embodiment, the tear strip 30' encompasses almost the entire container top 20'. Tear line 31' extends along the entire circumference of the container top 20' without any interruption. In this design, the user lifts the pull tab grab portion 43' which causes the pull tab

nose portion 41' to begin to tear the tear strip 30' along tear line 31'. The user then pulls the pull tab 40' towards the opposite side of the container to completely remove the pull tab 40' and the tear strip 30' from the container. In this embodiment, the pull tab 40' has the same symbolic shape as the pull  
5 tab 40 discussed above in reference to Figures 1-4.

Figure 6 shows a fourth preferred embodiment of the invention. In this embodiment, the pull tab 40'' is formed as two pieces such that the grab portion 43'' is severable from the nose portion 41''. The pull tab 40'' is made with a weakened portion 44 such as a scored line or perforation. The  
10 weakened portion extends at an angle between the grab portion 43'' and the nose portion 41'' so that the user may lift the grab portion 43'' to actuate the nose portion 41'' against the tear strip 30'' without separating the grab portion 43'' from the nose portion 41''. After opening the tear strip 30'', the grab portion 41'' may be removed from the nose portion 43'' by applying  
15 pressure in the direction of the weakened portion 44. The pull tab 40'' has the same symbolic shape as pull tab 40 as discussed above in reference to Figures 1-4. The two piece design further enhances the promotional or decorative function of the pull tab by allowing the user to keep a portion of the tab as a memento or token.

A representative apparatus for manufacturing pull tabs according to the invention is depicted in Figures 7-9. In a first embodiment, as shown in Figure 7, the apparatus comprises a modified conversion press 70. Typical  
20 conversion presses for the manufacture of prior art tabs are commercially available from such companies as Burderer or Minister. The modified press 70 includes a container end conveyer 71 for transporting container ends through the press 70. The container end conveyer 61 has an inlet 72 for accepting untabbed container ends and an outlet 73 through which tabbed container ends may be collected. The conveyer 71 transports container ends from the inlet 72, through the press 70, to the outlet 73, where tabbed  
25 container ends may be collected.

As depicted in Figure 7, the press 70 also includes a tab stock inlet 74 and a formed tab strip outlet 76. Interposed between the tab stock inlet 74 and tab strip outlet 76, and transversing the conveyer 71, is a die area 75. As generally known in the art, the die area 75 comprises a plurality of

cutting and stamping dies (not shown) which operate to form and shape materials pressing therethrough into a desired configuration. The die area 75 may treat container ends as they pass through the die area 75 on conveyer 71. According to the invention, tab stock 90 may enter the press 70 through the tab stock inlet 74. As depicted in Figure 7, a strip of tab stock 90 enters through the inlet 74 and then passes into the die area 75 where it is cut and shaped into formed tabs. The formed tab strip 91 may then exit the press 70 through formed tab strip outlet 76.

In a preferred embodiment, the die area 75 is composed of a plurality of interchangeable cutting dies and stamping dies. As will be appreciated by one of ordinary skill in the art, interchangeable parts allows a single press to be used in manufacturing a plurality of differently shaped symbolic and decorative tabs of a plurality of different materials. For example, the die could be rigged to produce a tab lacking a finger aperture by removing or blocking the aperture cutting dies. Further, the die area could be arranged to cut the pineapple shaped tab depicted in Figures 1-2 and 3A-D. Also, the die area could be arranged such that the tabs are stamped to emboss a pineapple-like texture onto the tab. In addition, the die area could be arranged such that the pineapple grab portion is scored such that it is detachable from the nose portion. Accordingly, numerous other modifications to the die area to produce symbolic and decorative tabs can be fully appreciated by the skilled artisan in view of this specification.

The formed tab strip 91 after exiting the press 70 through formed tab strip outlet 76 may reenter the press 70 through the formed tab strip inlet 77. The formed tab strip 91 is then fed into a riveting area 78 adjacent the conveyer 71. In the riveting area 78 formed tabs are removed from the formed tab strip 91 and riveted to container ends entering the rivetting area 78 via the conveyer 71. The formed tab strip scrap 92 then exits the rivetting area 78 and, ultimately, the press 70 through the tab scrap outlet 79. Container ends exit the riveting area 78, having tabs riveted thereto, by means of the conveyer 71. The conveyer ultimately feeds the tabbed container ends out of the press 70 at the conveyer outlet 73 where the container ends may be collected. The tab strip scrap 92 exiting the tab scrap

outlet 79 may also be collected and used for other purposes, such as being recycled into fresh tab stock 90.

Tab stock 90, according to the invention, may comprise any material capable of use as a pull tab container opening device. Exemplary materials include aluminum, steel, plastic, or any natural, synthetic, composite, or other suitable material. Similarly, combinations of materials as layers or otherwise may also be used. Accordingly, one of ordinary skill in the art will understand that corresponding manipulation of the modified press 70 may be necessary to accommodate different materials. In a preferred embodiment, the tab stock 90 comprises aluminum. As depicted in Figure 7, aluminum tab stock strips may be any suitable width and of any desired length. Generally, existing presses accommodate tab stock of either 1.9 or 2.8 inches in width and .009-.010 inches in depth. According to the present invention, the depth of the stock can be increased, depending on the strength desired and the material used. A preferred embodiment contemplates an aluminum strip of about 1-3 inches in width and about .0125 inches in depth.

Colored tab stock 90 may be used with the present invention if colored decorative are desired. To effectuate the coloring, pigmentation may be used while forming the tab stock 90, or alternatively, the tab stock 90 may be coated with a colored material. Similarly, as will be appreciated by one of ordinary skill in the art, other colored or coated materials, such as plastics, may be used.

To further enhance the decorative or symbolic power of the tabs, a tab decorating area 100 may be used. The tab decorating area 100 may be an area within the modified press 70, such as for example, embossing stamps or a silk screening station. Alternatively, the tab decorating area 100 may be located outside the press 70, although it may still be in-line or integral with the press 70. Embossing or other decorating may also be performed within the die area 75.

In a preferred embodiment as depicted in Figure 7, the tab decorating area 100 is located at an area whereby the tab stock 90 can be decorated prior to entering the tab stock inlet 74. The tab decorating area 100 may be integral with the feed mechanism that feeds tab stock 90 into the tab stock inlet 74; or alternatively, the tab decorating area 100 may be situated at a

location for treating tab stock 90 which is not even housed in the area where the press 70 is located. In other words, the tab stock 90 may be decorated and then brought to a location housing a press 70.

5 Figure 8 depicts an alternative embodiment of an apparatus for manufacturing pull tabs in accordance with the present invention. With reference to Figure 7, like reference numerals refer to the same elements; however, in this embodiment the tab decorating area 100 is located outside the press 70 but in-line with the tab stock 90 such that the formed tab strip 91 exits the press 70 at tab strip outlet 76 and then passes through tab  
10 decorating area 100 prior to reentering the press 70.

Although it is contemplated that the tab decorating area 100 may perform all of the decorating functions within the scope of the invention no matter where it is housed, placement of the tab decorating area 100 in-line and capable of receiving the formed tab strip 91 is a preferred process. First,  
15 the tabs are already formed in the strip which may enhance the speed and ability of the apparatus, through mechanical orientation or computer recognition, or otherwise, to provide substantially the same tab decorations on each tab. Secondly, the tab decorating area 100 may be used in connection with an actuator (not shown) that may be used to allow the die  
20 area 75 to operate at a faster pace than can be accommodated by the tab decorating area 100.

Figure 9 depicts another alternative embodiment of an apparatus for manufacturing tabs in accordance with the present invention. With reference to Figures 7 and 8, like reference numerals refer to like elements;  
25 however, the tab decorating area 100 in Figure 9 is located at an area for receiving tabbed container ends exiting the conveyor 71 at the conveyor outlet 73. In the specific embodiment depicted in Figure 9, the tab decorating area 100 is of a generally cylindrical shape. Disposed within the tab decorating area 100 is a cylindrical track 101 for accepting a plurality of  
30 tabbed container ends. The tab decorating area 100 also has an interior section 102 encircled by the cylindrical track 101.

In this embodiment, tabbed container ends exit the conveyor 71 at the conveyor outlet 73 and are received by the cylindrical track 101 of the tab decorating area 100. The track 101 may be rotated in either direction such



that the container ends may be rotated to or through one or more stations. With this arrangement, different tab decorations can be supplied to the tabs, or container ends, at different stations. Tab decorating machinery may be disposed within the interior section 102 of the tab decorating area 100 and/or located on the outer perimeter of the track 101. This embodiment may be preferred, or in combination with the previous embodiments, if decorations are to be supplied not only to the tabs, but also to the container ends.

The tab decorating area 100 of the present invention may be configured in any manner suitable for placing tab decorations on the tab stock, formed tab strip, or tabs before or after attachment to the container. The exact layout and design of the tab decorating area will vary according to the decorating methods to be used and the materials to be decorated. The tab decorating area may comprise an apparatus for embossing, debossing, inscribing or etching tab decorations, or any combination thereof. Similarly, the tab decorating area may comprise alone, or in combination with the above, any apparatus suitable for printing, screening, painting, adhering, gluing or otherwise placing or generating tab decorations on tabs or tab-making materials. The tab decorating area may make use of mechanical orientation or computer controlled artificial recognition systems to help ensure that the tab decorations appear substantially the same on the end product. It is also within the scope of the invention to make use of a plurality of tab decorating areas, for example, a combination of Fig. 7-9.

A preferred apparatus for use in a tab decorating area is an optical device, preferably a laser, capable of generating a substantially permanent tab decoration on a tab or tab making materials. For example, in making decorative or decorative-symbolic tabs for an aluminum container, anodized aluminum or aluminum coated with an organic coating may be used. Preferably, aluminum having an organic coating on at least one side is used. A plurality of coatings may also be used if a tab having multiple colors is desired. The anodized or coated aluminum is then treated with a laser that burns or etches a predetermined tab decoration into the tab or tab material such that aluminum shows through the coating or anodized layer. The laser may also be set such that a texture is provided. If multiple coatings are

used, the laser may be set such that a portion of the top layer of coating is etched to a desired depth (preferably a depth exposing the second layer or bare aluminum) and the second layer is also etched to a desired depth exposing a successive layer or bare aluminum, etc. . . . Accordingly, one of ordinary skill in the art will appreciate that numerous modifications to the coatings and laser settings may be done to effect speed of production, clarity of the tab decorations, depth of the etch, and desired pattern colors.

Presently preferred lasers are high powered lasers or lasers with precision marking capability, such as a 200 watt NDYAG (Neodymium Yttrium Aluminum Garnet) laser or a CO<sub>2</sub> laser. The CO<sub>2</sub> laser may be 600 watts.

In view of the foregoing, one of ordinary skill may appreciate how the decorative-symbolic tab depicted in Figures 1-2 and 3A-D may be manufactured for an aluminum container. For example, aluminum tab stock 90 may be provided having a first coating green in color and a top coating brown in color. The coatings may be applied at a first tab decorating area 100 located adjacent the tab stock inlet 74, or alternatively, an area away from the modified press 70. The tab stock 90 may be fed into the modified conversion press wherein the tab stock 90 is introduced into a die area 75 where a series of cutting and stamping dies transform the tab stock 90 into a formed tab strip 91 having tabs in the shape of a pineapple thereon, and possibly having an embossed pineapple-like texture. The formed tab strip 91 may then exit the conversion press 70 and enter a second tab decorating area 100 wherein mechanical orientation or computer controlled artificial recognition devices are used to ensure the formed tabs are correctly positioned in order to receive substantially similar tab decorations. A laser, or series of lasers, then burn or cut through a portion of the top coating exposing the green layer in an area near the nose portion corresponding to the pineapple's leaves. The laser, or lasers, also, simultaneously or in succession, burn or cut-through a portion of both coatings to expose the aluminum present underneath such that a pineapple pattern is generated. The laser, or lasers, or alternatively the thickness of the coatings may be adjusted prior to performing the process such that a pineapple-like texture will be provided by the process. The formed tab strip 91 then reenters the modified press 70 wherein the tabs are riveted to container ends in the

riveting area 75. The tabbed container ends then exit the press for further treatment in yet another tab decorating area 100 or they may be collected and attached to container bodies.

According to a further feature, the tab stock may be pre-etched or pre-marked, by laser or other means off line, prior to the formation process. The tabs may be etched or otherwise marked off line, after they are staked to the can tops. The invention also contemplates laser etching coated or anodized can tops, other portions of cans, aluminum or metallic bottle caps, plastic bottle caps, or other parts of beverage containers.

Figure 10 shows a can top 120. Formation of the can top 120 and pull tab can be done in a conversion press. During the can top formation process various bubbles and deformations known as "coins" may be imparted into the can top in order to enhance the strength thereof. The can top of figure 10 shows anti-buckle coins 121. The can top also includes a top opening score 122 and a top rim 123. A tab 124 is rivetted, or staked, onto a button 125 in the can top by a re-strike action of the conversion press. An additional coin 126 is also shown. Other deformations 127 may also be present to enhance the strength of the scored panel 128 to provide access to the contents of the container. The pull tab has a grab portion 129 which may be lifted to apply pressure through the nose portion 130 to the scored panel. A slit 131 is advantageously provided in the tab in order to facilitate its action as a lever with the staked button 125 acting as a fulcrum at the connection point. The grab portion is advantageously a closed-tab and exhibits a decoration 132 illustrated as a "VALUE MARK" logo.

According to an advantageous embodiment, the tab is fabricated from tab stock that is thicker than .01 inches, and preferably .0125 inches. The tab stock is coated with an organic coating material and the decoration is applied by a laser etching process. The can top itself may also be coated with an organic coating and a decoration 133 may be applied to the can top. The decoration 133 is shown as the "BRAND EQUITY" logo. The method for application of the decoration is preferably through the use of a laser to remove a portion of one or more coating layers to reveal a design.

Figure 11 shows an alternative embodiment of the invention. A container lid, such as a bottle cap 140, may also have a decoration 141

applied thereto. Once again, the decoration is advantageously applied by use of a laser to remove one or more layers of a coating material. The decoration in figure 7 is illustrated as the "BRAND DECOR" logo.

5 Figure 12 shows an illustration of an application technique for a design according to the invention. A substrate 150 is provided. According to an advantageous embodiment, the substrate may be the aluminum tab, or some other material to be decorated or marked. According to an advantageous embodiment, this material is a portion of a food or beverage container such as a top, a lid, or a container body or bottom. However, any  
10 other material may also be marked. As stated above, the substrate may be made of any suitable material and may form a part of a can top, a bottle cap, container lid, or any other portion of a container device.

A substrate may be coated with one or more contrasting layers. Figure 12 shows four layers of coatings, which may be any suitable colors or  
15 advantageously, a cyan layer 151, a magenta layer 152, a yellow layer 153, and a black layer 154. When the substrate is aluminum, a removal of all four layers, such as an area 155 reveals a natural aluminum color. Area 156 shows the removal of three layers revealing a cyan color. Area 157 shows the removal of two layers revealing a magenta color. Area 158 shows  
20 removal of a single layer revealing a yellow color. In the illustrated example, all areas with no layers removed will remain black. In this fashion, virtually any color can be generated.

It is understood that many modifications to this invention may be made without departing from the spirit of the invention. The appended  
25 claims express the scope of the invention.

What is claimed is:

- 1 1. A method of making a container opening device comprising the steps  
2 of:  
3 providing a portion of tab stock;  
4 decorating said tab stock with tab decorations;  
5 forming said tab stock into at least one pull tab;  
6 whereby said pull tab is capable of being attached to a container end.
- 1 2. The method of claim 1, wherein said decorating step is performed  
2 prior to said forming step.
- 1 3. The method of claim 1, wherein said decorating step is performed  
2 after said forming step.
- 1 4. The method of claim 1, further comprising the step of attaching said  
2 pull tab to said container end, wherein said attaching step is performed prior  
3 to said decorating step.
- 1 5. The method of claim 1, wherein said tab stock comprises a material  
2 selected from the group consisting of metal, plastic, composite material,  
3 natural material, and synthetic material.
- 1 6. The method of claim 5, wherein said material has a thickness of  
2 greater than .01 inches.

1 7. The method of claim 5, wherein said material has a thickness of  
2 greater equal to greater than .0125 inches.

1 8. The method of claim 5, wherein said material is .0125 inches thick.

1 9. The method of claim 5, wherein said material is pigmented.

1 10. The method of claim 1, wherein said material has a substantially  
2 permanent coating applied to at least the top side.

1 11. The method of claim 10, wherein said material has a plurality of  
2 layers of substantially permanent coatings on a least the top side.

1 12. The method of claim 10, wherein said coating material is an organic  
2 material.

1 13. The method of claim 10, wherein the decorating step comprises  
2 contacting said coated tab stock with a laser.

1 14. The method of claim 1, wherein the forming step comprises contacting  
2 said tab stock with a conversion press.

1 15. The method of claim 1, wherein the forming step comprises forming  
2 said tab stock into a pull tab with a symbolic shape.

1 16. The method of claim 1, wherein said pull tab is in the shape of a  
2 closed-end tab.

1 17. The method of claim 1, wherein the decorating step comprises  
2 embossing, debossing, inscribing or etching tab decorations on said tab stock.

1 18. The method of claim 18, wherein the tab stock is coated with at least  
2 one layer of a substantially permanent coating material prior to being  
3 embossed, debossed, inscribed or etched.

1 19. The method of claim 1, wherein the decorating step comprises  
2 contacting said tab stock with the emission of an optical device.

1 20. The method of claim 19, wherein the optical device comprises a laser.

1 21. The method of claim 20, wherein the laser is a NYDAG laser or CO2  
2 laser.

1 22. A container opening device comprising:  
2 a pull tab exhibiting a substantially planar member having an  
3 attachment point for attachment to a container with a closed grab portion  
4 oriented to one side of said attachment point and a nose portion oriented on  
5 an opposite side of said attachment point;  
6 said pull tab actuatable to open the container.

1 23. A container opening device according to claim 22, wherein:  
2 said nose portion is configured to abut against the container so that  
3 when a user actuates the grab portion, the nose portion puts pressure on the  
4 container to open the container.

1 24. A container opening device according to claim 22, wherein said pull  
2 tab is made of metal.

1 25. A container opening device according to claim 24, wherein said metal  
2 is aluminum.

1 26. A container opening device according to claim 25, wherein said  
2 aluminum is an alloy.

1 27. A container opening device according to claim 22, wherein said pull  
2 tab is made of a composite material.

1 28. A container opening device according to claim 22, wherein said pull  
2 tab is made of a natural material.

1 29. A container opening device according to claim 22, wherein said pull  
2 tab is made of a synthetic material.

1 30. A container opening device according to claim 22, further comprising a  
2 coating layer disposed on said pull tab.



1 31. A container opening device according to claim 22, wherein said coating  
2 layer is an anodic coating.

1 32. A container opening device according to claim 22, wherein said coating  
2 layer is an organic coating.

1 33. A container opening device according to claim 29, further comprising  
2 an image located on said pull tab created by localized removal of said coating  
3 layer.

1 34. A container opening device according to claim 27, further comprising  
2 an image located on said pull tab created by localized removal of said coating  
3 layer.

1 35. A container opening device according to claim 27, further comprising a  
2 plurality of contrasting coating layers disposed on said pull tab.

1 36. A container opening device according to claim 22, further comprising  
2 an image located on said pull tab created by selective localized removal of  
3 one or more of said coating layers.

1 37. A container opening device according to claim 22, further comprising  
2 one or more laser etched coating layers disposed on said pull tab.

1 38. A container comprising:

- 2 a container substrate;  
3 one or more laser etched coating layers disposed on said substrate.

1 39. A container according to claim 38, wherein said substrate is a  
2 container body.

1 40. A container according to claim 38, wherein said substrate is a  
2 container top.

1 41. A container according to claim 38, wherein said substrate is a  
2 container pull tab.

1 42. A container according to claim 38, wherein said coating layer is an  
2 organic coating.

1 43. A container according to claim 38, wherein said coating layer is an  
2 anodic coating.

1 44. A container opening device comprising:  
2 a pull tab comprising a substantially planar member having an  
3 attachment point for attachment to a container;  
4 said pull tab actuatable to open the container.

1 45. A container opening device as in claim 44, wherein said planar  
2 member comprises a top planar surface and a bottom planar surface.

1 46. A container opening device as in claim 45, wherein said top planar  
2 surface and said bottom planar surface are generally parallel to one another  
3 throughout the pull tab.

1 47. A container opening device according to claim 44, wherein:  
2 said planar member of said pull tab comprises a grab portion on one  
3 side of said attachment point for actuation by the user;  
4 said pull tab further comprises a nose portion on an opposite side of  
5 said attachment point and configured to abut against the container so that  
6 when a user actuates the grab portion, the nose portion puts pressure on the  
7 container to open the container.

1 48. A container opening device according to claim 47, wherein said nose  
2 portion is also a substantially planar member.

1 49. A container opening device according to claim 47, said pull tab further  
2 comprising a weakened portion between the grab portion and the nose  
3 portion so that the grab portion is separable from the nose portion.

1 50. A container opening device according to claim 44, wherein said pull  
2 tab is made of metal.

1 51. A container opening device according to claim 44, wherein said pull  
2 tab is made of plastic.

1 52. A container opening device according to claim 44, wherein said pull  
2 tab is made of a composite material.

1 53. A container opening device according to claim 44, wherein said pull  
2 tab is made of a natural material.

1 54. A container opening device according to claim 44, wherein said pull  
2 tab is made of a synthetic material.

1 55. A container opening device according to claim 44, further comprising  
2 an image attached to the pull tab.

1 56. A container opening device according to claim 44, further comprising  
2 an image embossed on the pull tab.

1 57. A container opening device according to claim 44, further comprising a  
2 label attached to the pull tab.

1 58. A container opening device according to claim 44, wherein said planar  
2 member comprises a substantially flat sheet of material.

1 59. A container opening device according to claim 58, wherein said flat  
2 sheet of material has a uniform thickness throughout the sheet.

1 60. A container opening device comprising:

2 a pull tab comprising a continuously solid plate having an attachment  
3 point for attachment to a container;  
4 said pull tab actuatable to open the container.

1 61. A container opening device as in claim 60, wherein said solid plate has  
2 no aperture therethrough.

1 62. A container opening device according to claim 60, wherein:  
2 said solid plate of said pull tab comprises a grab portion on one side of  
3 said attachment point for actuation by the user;  
4 said pull tab further comprises a nose portion on an opposite side of  
5 said attachment point and configured to abut the container so that when a  
6 user actuates the grab portion, the nose portion puts pressure on the  
7 container to open the container.

1 63. A container opening device according to claim 62, wherein said nose  
2 portion is also a continuously solid plate.

1 64. A container opening device according to claim 62, further comprising a  
2 weakened portion on the pull tab between the grab portion and the nose  
3 portion so that the grab portion is separable from the nose portion.

1 65. A container opening device according to claim 60, wherein said pull  
2 tab is made of metal.

1 66. A container opening device according to claim 60, wherein said pull  
2 tab is made of plastic.

1 67. A container opening device according to claim 60, wherein said pull  
2 tab is made of a composite material.

1 68. A container opening device according to claim 60, wherein said pull  
2 tab is made of a natural material.

1 69. A container opening device according to claim 60, wherein said pull  
2 tab is made of a synthetic material.

1 70. A container opening device according to claim 60, further comprising  
2 an image attached to the pull tab.

1 71. A container opening device according to claim 60, further comprising  
2 an image embossed on the pull tab.

1 72. A container opening device according to claim 60, further comprising a  
2 label attached to the pull tab.

1 73. A container opening device according to claim 60, wherein said solid  
2 plate comprises a substantially flat sheet of material.

1 74. A container opening device according to claim 73, wherein said flat  
2 sheet of material has a uniform thickness throughout the sheet.

1 75. A container opening device comprising:  
2 a pull tab comprising a symbolic shape having an attachment point for  
3 attachment to said container;  
4 said pull tab actuatable to open the container.

1 76. A container opening device according to claim 75, wherein said  
2 symbolic shape further comprises a substantially planar member.

1 77. A container opening device according to claim 75, wherein said  
2 symbolic shape further comprises a continuously solid plate.

1 78. A container opening device according to claim 77, wherein said solid  
2 plate has no aperture therethrough.

1 79. A container opening device according to claim 75, wherein said  
2 symbolic shape further comprises a flat sheet of material.

1 80. A container opening device according to claim 79, wherein said flat  
2 sheet of material has a uniform thickness throughout the sheet.

1 81. A container opening device according to claim 75, wherein:

2       said symbolic shape of said pull tab comprises a grab portion on one  
3 side of said attachment point for actuation by the user;

4       said pull tab further comprises a nose portion on an opposite side of  
5 said attachment point and attached to said symbolic shape;

6       said nose portion configured to abut against the container so that  
7 when a user actuates the grab portion, the nose portion puts pressure on the  
8 container to open the container.

1   82.   A container opening device according to claim 75, wherein:

2       said symbolic shape of said pull tab comprises a grab portion on one  
3 side of said attachment point and a nose portion on an opposite side of said  
4 attachment point;

5       said nose portion configured to abut against the container so that  
6 when a user actuates the grab portion, the nose portion puts pressure on the  
7 container to open the container.

1   83.   A container opening device according to claim 81, further comprising a  
2 weakened portion on the pull tab between the grab portion and the nose  
3 portion so that the grab portion is separable from the nose portion.

1   84.   A container opening device according to claim 82, further comprising a  
2 weakened portion on the pull tab between the grab portion and the nose  
3 portion so that the grab portion is separable from the nose portion.



1 85. A container opening device according to claim 75, wherein said pull  
2 tab is made of metal.

1 86. A container opening device according to claim 75, wherein said pull  
2 tab is made of plastic.

1 87. A container opening device according to claim 75, wherein said pull  
2 tab is made of a composite material.

1 88. A container opening device according to claim 75, wherein said pull  
2 tab is made of a natural material.

1 89. A container opening device according to claim 75, wherein said pull  
2 tab is made of a synthetic material.

1 90. A container opening device according to claim 75, further comprising  
2 an image attached to the pull tab.

1 91. A container opening device according to claim 75, further comprising  
2 an image embossed on the pull tab.

1 92. A container opening device according to claim 75, further comprising a  
2 label attached to the pull tab.

1 93. A container comprising:

2 a container top;  
3 a tear strip in the container top for opening the container top;  
4 a pull tab having an attachment point attached to the container top,  
5 said pull tab articulated against the tear strip so that the pull tab is  
6 actuatable to open the tear strip.

1 94. A container according to claim 93, wherein said pull tab further  
2 comprises a symbolic shape.

1 95. A container according to claim 94, wherein said symbolic shape  
2 comprises:

3 a grab portion on one side of said attachment point for actuation by  
4 the user; and,

5 a nose portion on an opposite side of said attachment point and  
6 attached to said grab portion;

7 said nose portion articulated against said tear strip so that when a  
8 user actuates the grab portion, the nose portion puts pressure on the tear  
9 strip to separate the tear strip from the container top and open the  
10 container.

1 96. A container according to claim 95, further comprising a weakened  
2 portion on the pull tab between the grab portion and the nose portion so  
3 that the grab portion is separable from the nose portion.

1 97. A container according to claim 94, wherein said tear strip is defined  
2 by a tear line in the container top having an interruption so that the tear  
3 strip remains attached to the container top after the pull tab separates the  
4 tear strip from the container top to open the container.

1 98. A container according to claim 94, wherein said tear strip  
2 encompasses nearly the entire container top and is defined by a continuous,  
3 uninterrupted tear line in the container top forming a closed geometric  
4 shape so that the entire tear strip is removable from the container top after  
5 the pull tab separates the tear strip from the container top to open the  
6 container.

1 99. A container according to claim 94, wherein said pull tab is made of  
2 metal.

1 100. A container according to claim 94, wherein said pull tab is made of  
2 plastic.

1 101. A container according to claim 94, wherein said pull tab is made of a  
2 composite material.

1 102. A container according to claim 94, wherein said pull tab is made of a  
2 natural material.

1 103. A container according to claim 94, wherein said pull tab is made of a  
2 synthetic material.

1 104. A container according to claim 94, further comprising an image  
2 attached to the pull tab.

1 105. A container according to claim 94, further comprising an image  
2 embossed on the pull tab.

1 106. A container according to claim 94, further comprising a label attached  
2 to the pull tab.

1 107. A container according to claim 94, wherein said pull tab is riveted to  
2 said container top.

1 108. A container according to claim 93, wherein said pull tab further  
2 comprises a substantially planar member.

1 109. A container according to claim 93, wherein said pull tab further  
2 comprises a continuously solid plate.

1 110. A container according to claim 109, wherein said solid plate has no  
2 aperture therethrough.

1 111. A container according to claim 93, wherein said pull tab further  
2 comprises a flat sheet of material.

1 112. A container according to claim 111, wherein said flat sheet of material  
2 has a uniform thickness throughout the sheet.

1/7

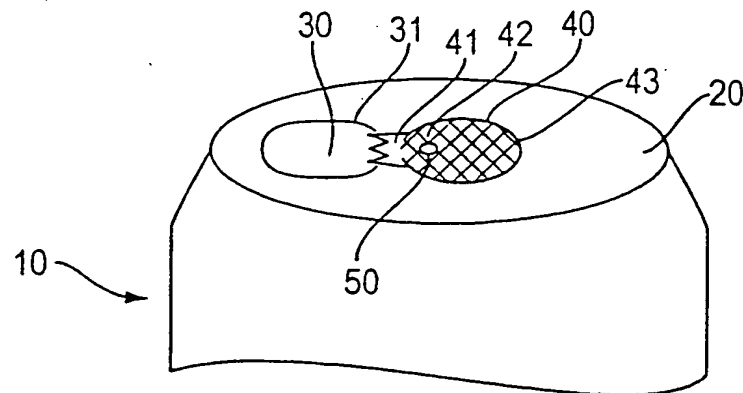


FIG. 1

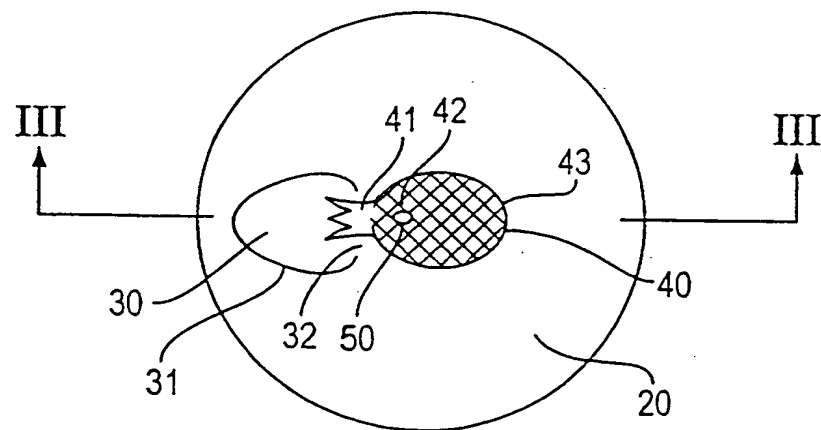


FIG. 2

2/7

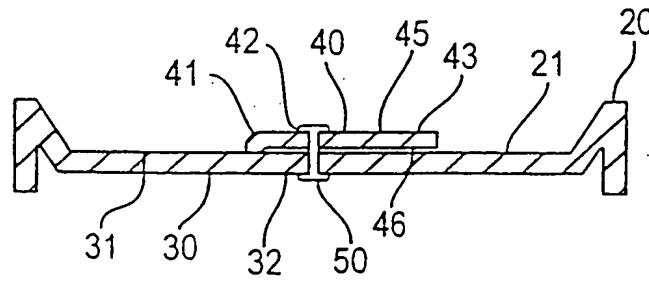


FIG. 3A

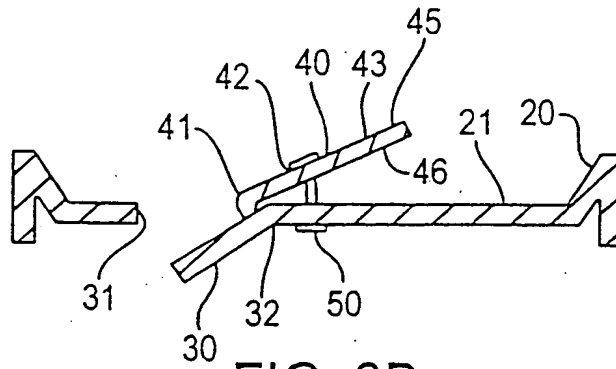


FIG. 3B

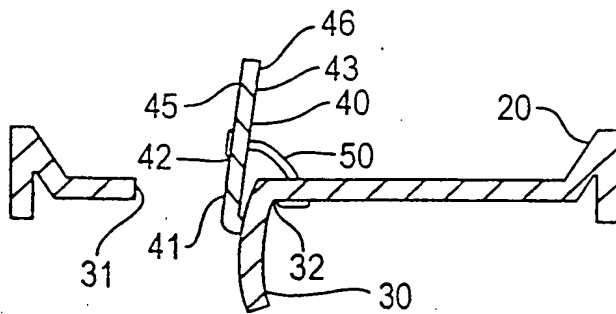


FIG. 3C

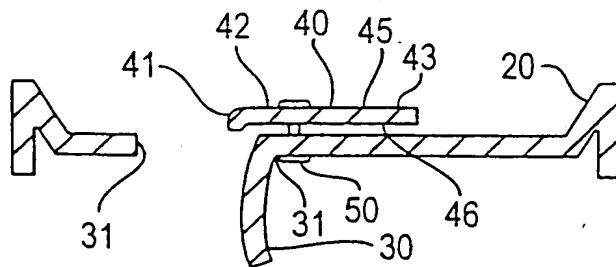


FIG. 3D

3/7

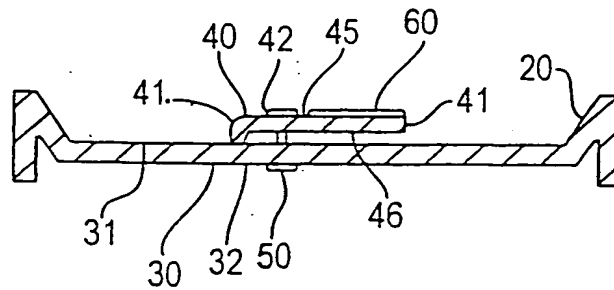


FIG. 4

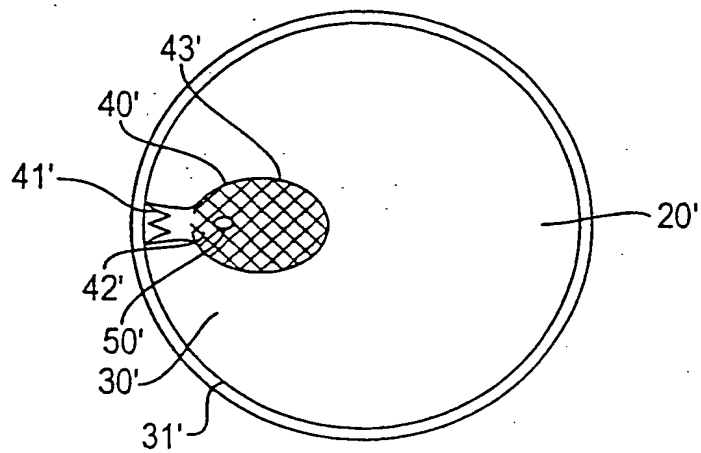


FIG. 5

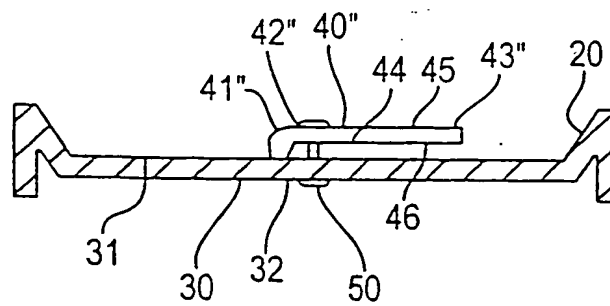


FIG. 6



4/7

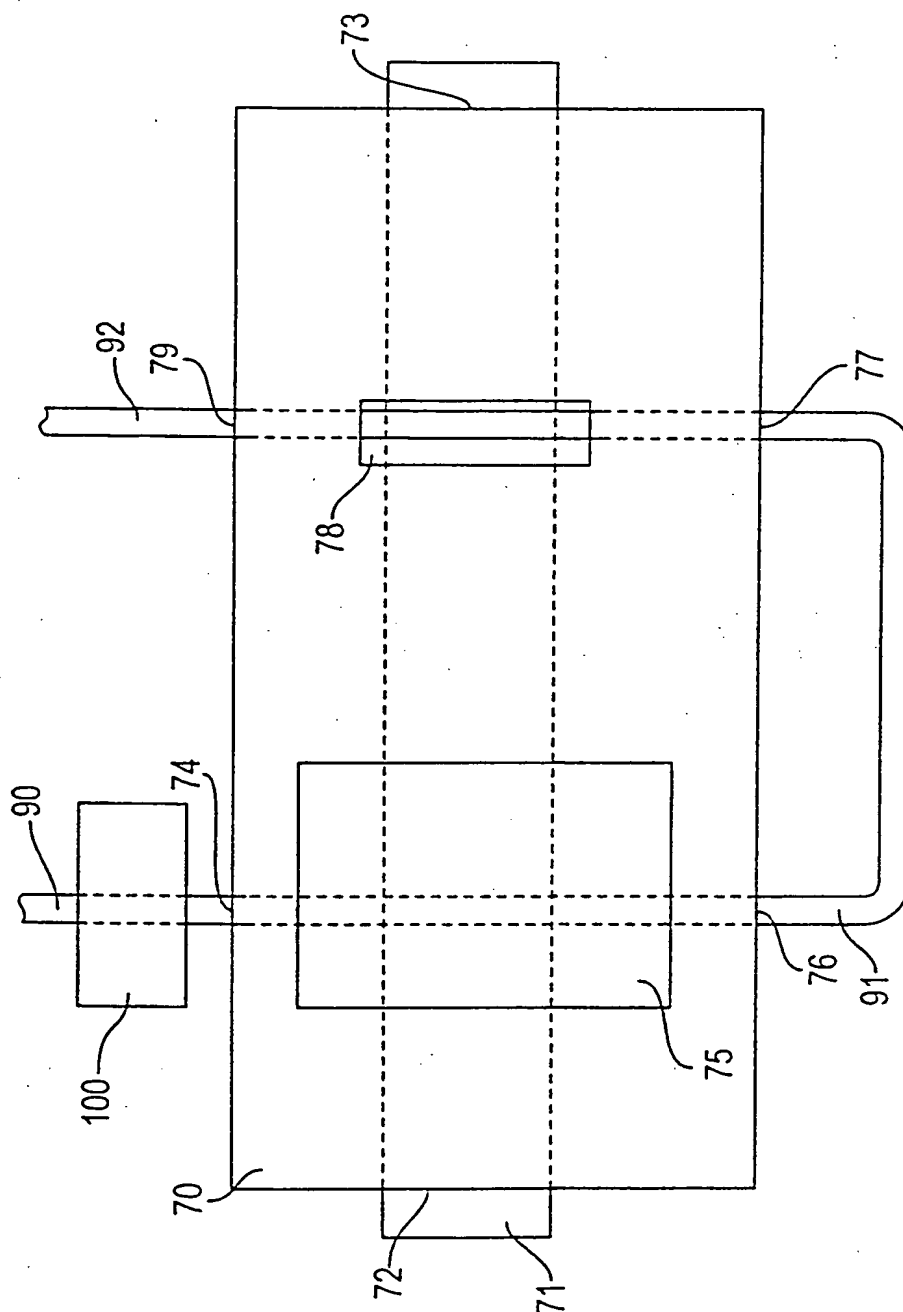


FIG. 7

5/7

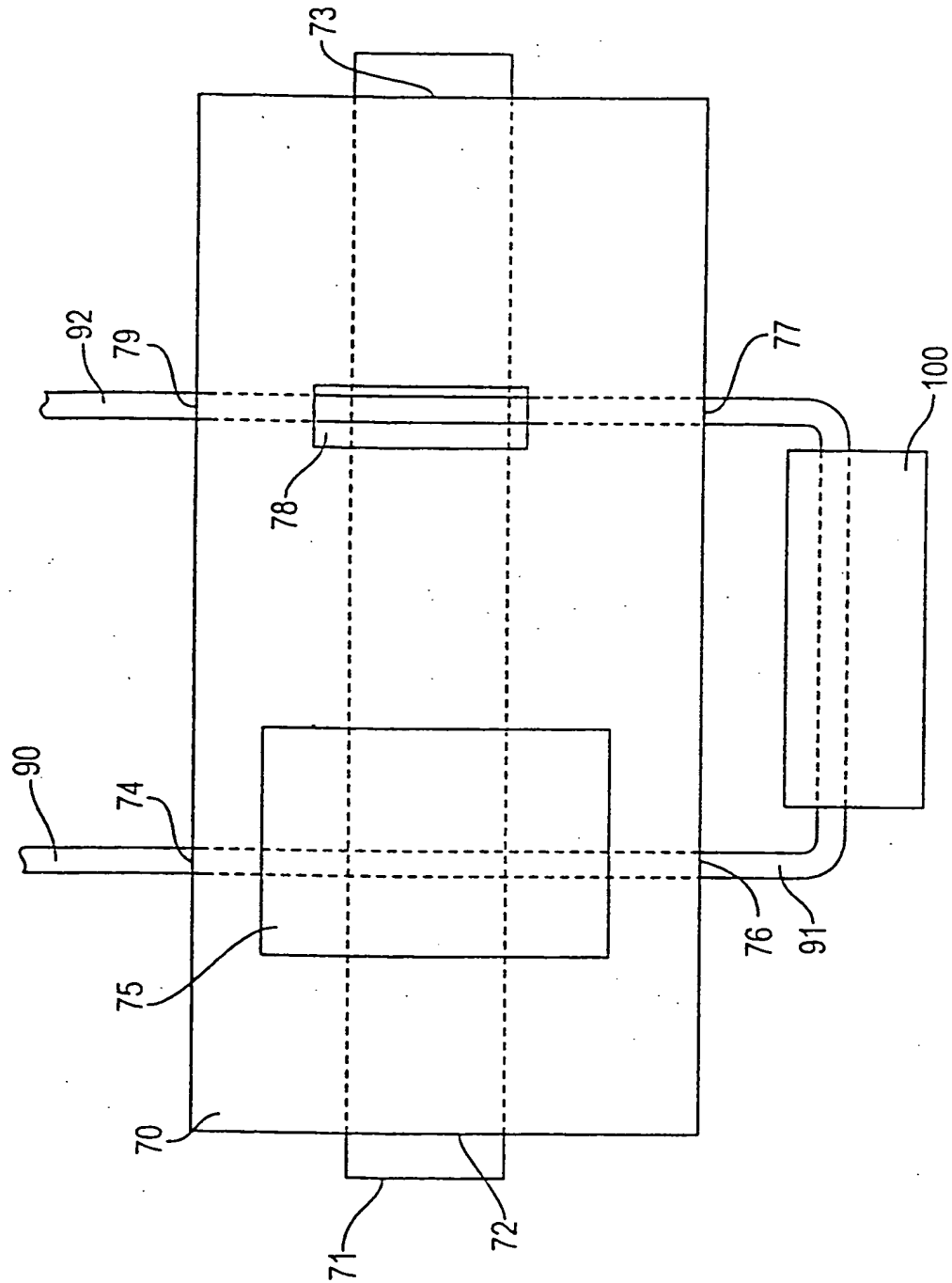
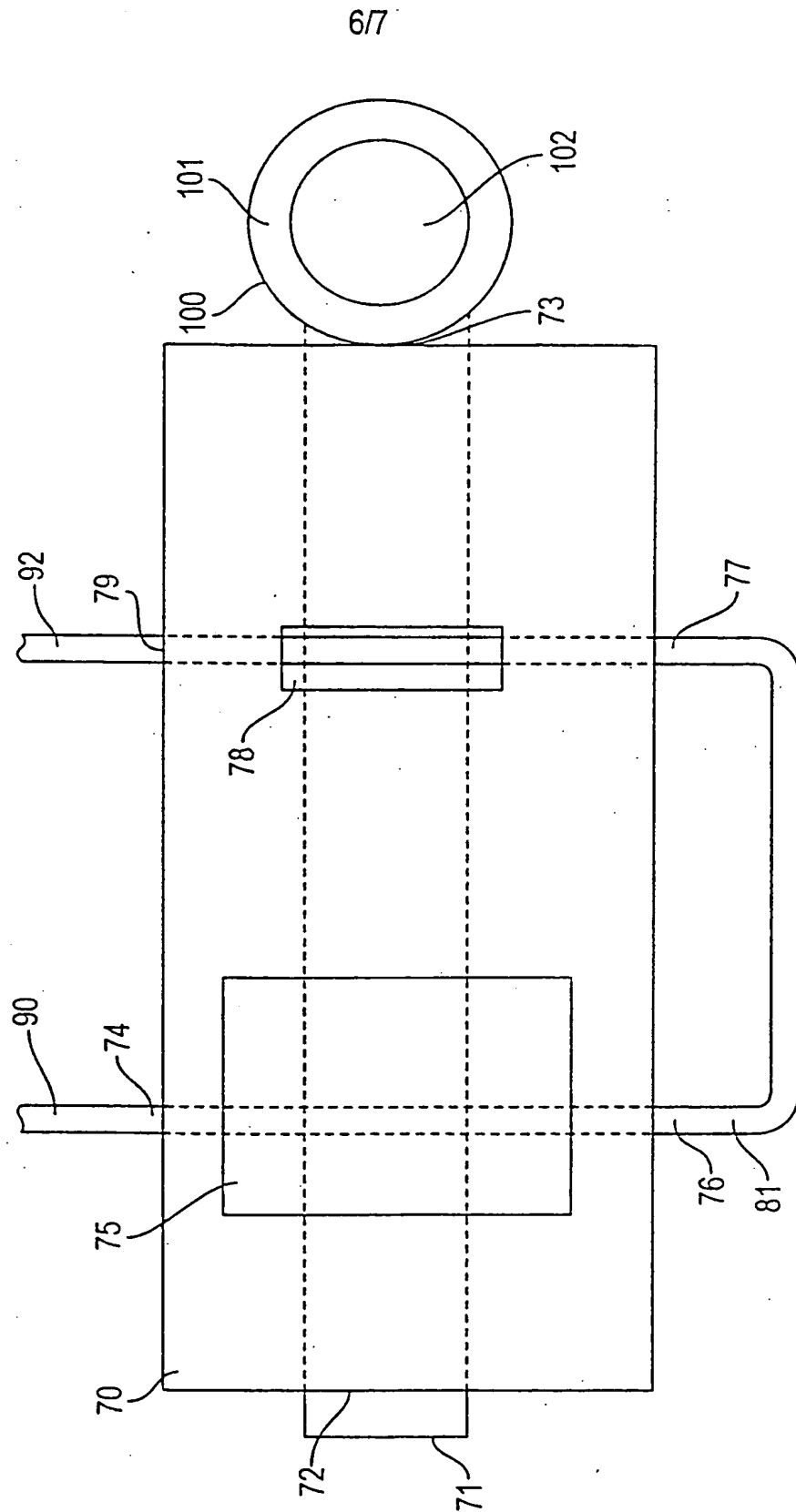


FIG. 8



7/7

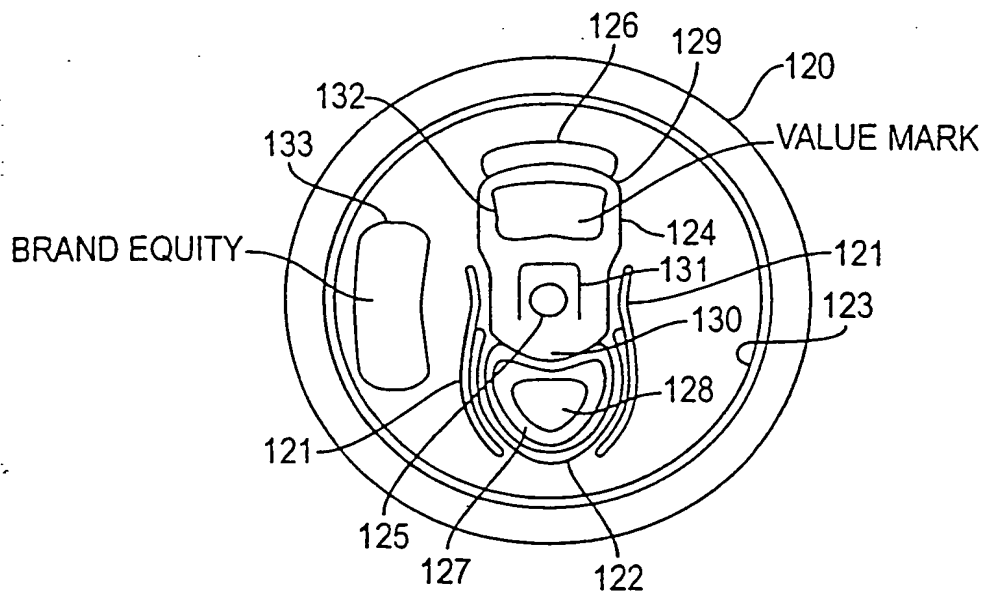


FIG. 10

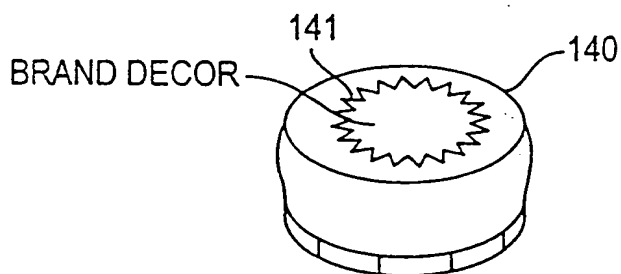


FIG. 11

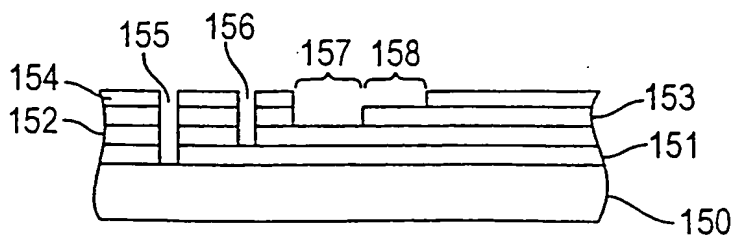


FIG. 12

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 98/00818

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**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-37, 44-74

A container opening device comprising a pull tab having a grab portion, a nose portion and an attachment point, and a method for its manufacture.

2. Claims: 38-43

A container comprising a substrate and one or more laser etched coating layers on the substrate

3. Claims: 75-92

A container opening device comprising a pull tab having a symbolic shape and used for opening a container

4. Claims: 93-112

A container opening device comprising a pull tab having a symbolic shape and used for opening a container

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/CA 98/00818

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 98/00818

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 822 496 A (MINDER D) 9 July 1974  see the whole document ---	75-80, 85,88, 90,91
A	FR 2 649 628 A (DUVICO ETS CHARLES) 18 January 1991 see the whole document ---	38-43
A	US 4 363 179 A (RUEMER JR JOHN ET AL) 14 December 1982 see the whole document ---	1-37, 44-112
A,P	FR 2 750 396 A (AKLINE) 2 January 1998  see the whole document -----	1,22,44, 60,75,93



## INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 98/00818

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
		98,100, 101, 103-106, 110
Y	GB 1 124 958 A (HARVEY ALUMINIUM) see page 3, line 32 - line 55; figures 1-12A	6-8
X	US 3 958 354 A (HOUGH ROBERT J ET AL) 25 May 1976	22-29, 44-48, 50-55, 58,59
Y	see the whole document	18, 30-37, 49,56, 57,66, 67,98
Y	GB 2 185 613 A (METAL BOX PLC) 22 July 1987	9,18,30, 32,35, 56,86, 87,89, 91,100, 101,103, 105
X	see the whole document	22,23, 29,44
Y	EP 0 482 776 A (CMB FOODCAN PLC) 29 April 1992	13, 17-21, 31,33, 34,36,37
	see column 3, line 21 - line 35; figures 1-9	
Y	US 4 322 016 A (BARRASH MARSHALL J) 30 March 1982	57,72, 90,92, 104,106
X	see the whole document	22,44, 60,75,93
Y,P	GB 2 320 008 A (CADBURY SCHWEPES PLC) 10 June 1998	49,64, 78,110
X	see the whole document	1,22-28, 30,32, 44,60, 75,93
X,P	DE 197 01 547 A (SCHMALBACH LUBECA) 12 March 1998 see the whole document	38-43
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# INTERNATIONAL SEARCH REPORT

Int. Application No

PCT/CA 98/00818

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 B65D17/34 B41M5/24

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B65D B41M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 380 129 A (BARRASH MARSHALL J) 19 April 1983	1-5, 10-12, 14-16, 60-63, 65, 68, 70, 71, 73-77, 79-85, 88, 93-97, 99, 102, 107-112
Y	see the whole document	6-9, 13, 17-21, 64, 66, 67, 72, 78, 86, 87, 89-92,
	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"Z" document member of the same patent family

Date of the actual completion of the international search

24 March 1999

Date of mailing of the international search report

06.04.99

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